

Parent/Guardian Signature: _____

Name: _____

Grade 9 Science: Electricity Test

Expectation	Level Achieved
E1 - assess some of the costs and benefits associated with the production of electrical energy from renewable and non-renewable sources, and analyse how electrical efficiencies and savings can be achieved, through both the design of technological devices and practices in the home	
E2 - investigate, through inquiry, various aspects of electricity, including the properties of static and current electricity, and the quantitative relationships between potential difference, current, and resistance in electrical circuits;	
E3 - demonstrate an understanding of the principles of static and current electricity	
OVERALL LEVEL	

Communication Criteria					
Criteria	Level R	Level 1	Level 2	Level 3	Level 4
Communication Vocabulary Organization Accuracy	<ul style="list-style-type: none"> Organization of ideas and information is not evident Use of conventions, vocabulary, and terminology of the discipline is not evident 	<ul style="list-style-type: none"> Expresses and organizes ideas and information with limited effectiveness Uses conventions, vocabulary, and terminology of the discipline with limited effectiveness 	<ul style="list-style-type: none"> Expresses and organizes ideas and information with some effectiveness Uses conventions, vocabulary, and terminology of the discipline with some effectiveness 	<ul style="list-style-type: none"> Expresses and organizes ideas and information with considerable effectiveness Uses conventions, vocabulary, and terminology of the discipline with considerable effectiveness 	<ul style="list-style-type: none"> Expresses and organizes ideas and information with a high degree of effectiveness Uses conventions, vocabulary, and terminology of the discipline with a high degree of effectiveness

General Teacher Comments

USEFUL STUFF

Electrostatic Series:

Glass	<div>Weak attraction of electrons</div> <div>↓</div> <div>Strong attraction of electrons</div>
Human Hair	
Nylon	
Wool	
Fur	
Silk	
Cotton	
Lucite	
Polyester	
Foam	
Ebonite	

Show the word equations (or symbols) for your work **BEFORE** doing the calculations.

Ex. Acceleration = $\frac{\text{change in velocity}}{\text{time}}$

Or $a = \frac{v}{t}$

E1 – Energy at Home

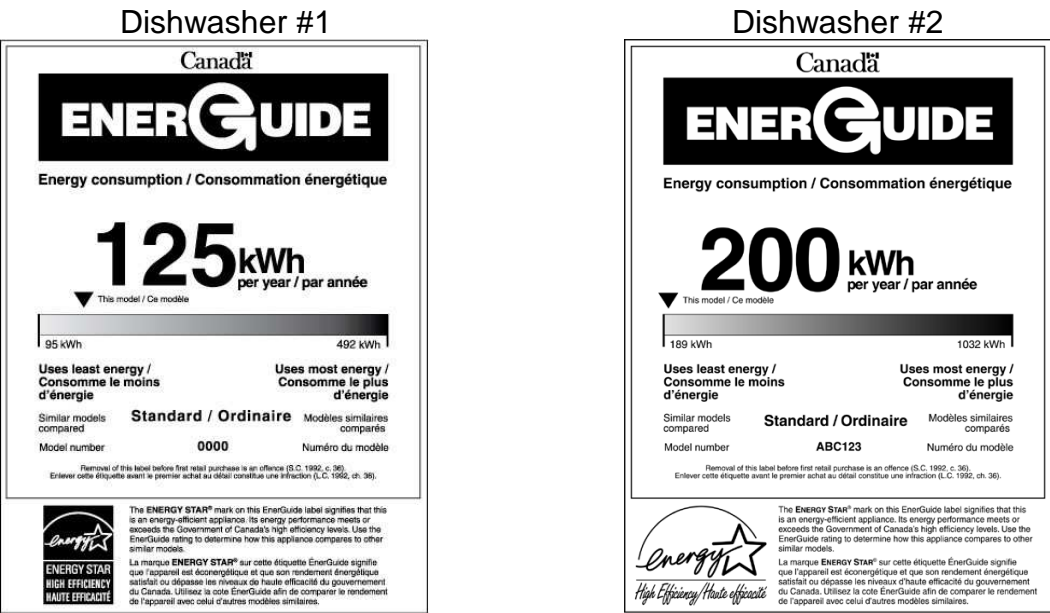
1. What is the efficiency of the fluorescent lights in our school if each bulb uses 100 000 J of electrical energy to produce 40 000 J of light energy?

2. **Describe** (don't just name) one source of renewable energy. In your answer explain why this source of renewable energy is beneficial, as well as one **drawback** of using this method.

3. What are EnerGuide and ENERGY STAR, and how can they be used when purchasing appliances or electronics?

4. What appliances consume electrical energy even when they are not in use?

5. When comparing washing machines you find two different styles that you like; one is a front loader and the other is a top loader. The EnerGuide labels from the two models are shown below.



(a) Which washer will cost more to run, how do you know?

(b) Which washer is more efficient in comparison to other similar models, how do you know?

E2 – Investigative Skills

1. An ebonite rod is rubbed with wool.

a) Draw a diagram to show how a neutral metal foil electroscope will respond when the ebonite rod is **brought close to it** (not touching). Indicate the position of the charges on the ebonite rod and on the electroscope.

b) What method was used to charge the electroscope?

2. Object A has a negative charge. Object A is repelled by object B. Object B is attracted to object C and repelled by object D. Object C is attracted to object D. What are the charges on objects B, C, D?

Object	Charge
A	negative
B	
C	
D	

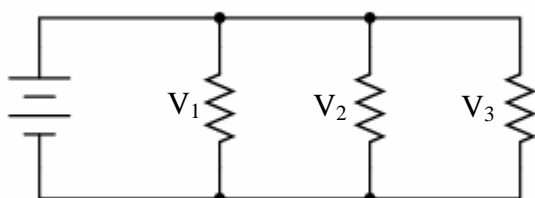
3. Wool socks and a cotton t-shirt are tumbled in a clothes dryer. Predict the type of charge on each, explain how each material acquires a charge.

4. Draw a circuit diagram for a circuit containing a 4.5 V battery connected to a light bulb, and a resistor all connected in parallel. An ammeter is connected to measure the current going through to the light bulb. A switch is connected to control the resistor. A voltmeter is connected to measure the potential difference across the resistor. USE PROPER SYMBOLS!

Rough work

Final work (the one to be assessed)

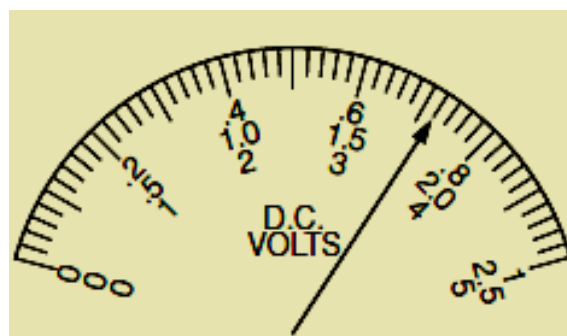
5. The circuit below contains three resistors, V_1 , V_2 , and V_3 . All three resistors have the same resistance.



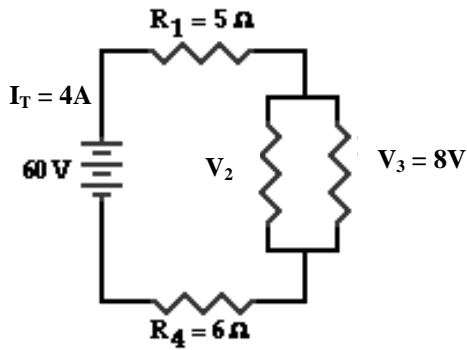
- If the potential difference across V_1 and V_2 is 3.0V what is the potential difference across V_3 ?
- The total current in the circuit is 3.0A. What is the current flowing through each of the resistors?
- What is the resistance of R_3 ? Show your work.

6. Determine the values indicated by the following meter.

What is the reading if the	Answer
5 V scale is used?	
2.5 V scale is used?	
1 V scale is used?	



7. For the circuit shown, determine the unknown values.



$$I_T = 4A$$

$$I_1 = \underline{\hspace{2cm}}$$

$$I_2 = \underline{\hspace{2cm}}$$

$$I_3 = \underline{\hspace{2cm}}$$

$$I_4 = \underline{\hspace{2cm}}$$

$$V_1 = \underline{\hspace{2cm}}$$

$$V_2 = \underline{\hspace{2cm}}$$

$$V_4 = \underline{\hspace{2cm}}$$

$$V_T = 60V$$

$$R_3 = \underline{\hspace{2cm}}$$

E3 – Static vs. Current Electricity

- The nucleus of an atom contains:
 - positive electrons and neutral neutrons
 - negative electrons and neutral neutrons
 - positive protons and neutral neutrons
 - negative electrons and negative neutrons
- The Law of Attraction and Repulsion states:
 - both unlike charges + like charges attract
 - like charges attract + unlike charges repel
 - both unlike charges + like charges repel
 - unlike charges attract + like charges repel
- An electrical load may be disconnected without affecting other loads in a _____ circuit.
 - series
 - closed
 - open
 - parallel
- Which of the following is **NOT** a method used to charge an object?
 - friction
 - magnetism
 - conduction
 - induction
- Charge is measured in:
 - amperes
 - ohms
 - coulombs
 - volts
- The letter I is the symbol used for:
 - charge
 - current
 - energy
 - potential difference
- When charging an object by **contact** using a negatively charged rod, the resulting charge on the initially neutral object will be:
 - positive
 - neutral
 - negative
 - twice as strong
- A part that can be left out of a complete circuit is the:
 - power source
 - switch
 - load
 - conducting wires
- A substance in which electrons cannot move freely from atom to atom is called:
 - a resistor
 - a semiconductor
 - a conductor
 - an insulator
- The ability to impede the flow of electrons in a circuit is called what?
 - power
 - voltage drop
 - resistance
 - current

11. Sketch a graph that shows the change in resistance (dependant variable) as the temperature in $^{\circ}\text{C}$ (independent variable) of the conductor increases.

Full marks for correctly labelling and drawing the Graph.

Complete the statement:

As temperature increases, resistance _____.



12. List the three methods of building up a static charge. Draw a diagram to show how each works.

BONUS QUESTIONS – Only answer if EVERY other question is fully complete. Will not be marked if questions have been left blank!!!!!!

- 1.) Explain how or why our brains use electricity
- 2.) Which lobe in the brain is most important for math calculations?
- 3.) What species ranked second in terms of brain to body ratio? (this is also Ms. Vlug's favourite mammal!!)